MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE

Madanapalle

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Estd 1998

MASTER OF TECHNOLOGY

Computer Science & Engineering

COURSE STRUCTURE

&

DETAILED SYLLABI

For the students admitted to

Master of Technology in Computer Science & Engineering from the academic year 2018-19 Batches onwards

M. Tech Regular Two Year P. G. Degree Course

CURRICULUM STRUCTURE

I Year I Semester

Sl.No.	Course Code	Name of the Course	Credits
1	18CSEP101	Advanced Algorithms and Data Structures	3
2	18CSEP102	Advanced Operating Systems	3
	Discipline Electives - I		
3	18CSEP401	Advanced Computer Networks	3
	18CSEP402	Wireless Sensor Networks	3
	18CSEP403	High Performance Computing	3
	Discipline Electives - II		
4	18CSEP404	Data Science	3
	18CSEP405	Machine Learning	3
	18CSEP406	Human and Computer Interaction	3
5	18CSEP201	Advanced Algorithms and Data Structures Lab	2
6	18CSEP202	Advanced Operating Systems Lab	2
7	18RMP101	Research Methodology & IPR	2
		Audit Course - I	
8	18AUP901	Disaster Management	0
	18AUP902	Sanskrit for Technical Knowledge	
	18AUP903	Constitution of India	
	18AUP904	Pedagogy Studies	
		Total Credits	18

I Year II Semester

Sl.No.	Course Code	Name of the Course	Credits
1	18CSEP103	Cloud Computing	3
2	18CSEP104	Big Data Analytics	3
	Discipline Electives - III		
3	18CSEP407	Object oriented Software Engineering	3
	18CSEP408	Secure Software Design & Enterprise Computing	
	18CSEP409	Design Patterns	
	Discipline Electives - IV		
4	18CSEP410	Computer Vision	3
	18CSEP411	Pattern Recognition	
	I8CSEP412	Bio Informatics	
5	18CSEP203	Cloud Computing Lab	2
6	18CSEP204	Big Data Analytics Lab	2
7	18CSEP701	Mini Project	2
		Audit Course - II	
8	18AUP905	English for Research Paper Writing	0
	18AUP906	Value Education	
	18AUP907	Stress Management by Yoga	
	18AUP908	Personality Development through Life Enlightment Skills	
		Total Credits	18

II Year I Semester

Sl.No.	Course Code	Name of the Course	Credits
	Discipline Electives - V		
1	18CSEP413	Mobile Applications and Web Services	3
	18CSEP414	Model driven Software Development	
	18CSEP415	Network Security	
	Open Electives		
2	18OEP301	Business Analytics	3
	18OEP302	Industrial Safety	
	18OEP303	Operations Research	
	18OEP304	Cost Management of Engineering Projects	
	18OEP305	Composite Materials	
	18OEP306	Waste to Energy	
3	18CSEP702	Dissertation Phase I	10
		Total Credits	16

II Year II Semester

Sl.No.	Course Code	Name of the Course	Credits
1	18CSEP703	Dissertation Phase II	16
		Total Credits	16

M. Tech I Year I Semester

18CSEP101 ADVANCED ALGORITHMS AND DATA STRUCTURES

L	T	P	C
3	0	0	3

Course Prerequisite: NIL

Course Description:

This course covers advance data structures and algorithms. Data structures play a central role in modern computer science. In addition, data structures are essential building blocks in obtaining efficient algorithms.

Course Objectives:

1. To introduce and practice advanced algorithms and programming techniques necessary for developing sophisticated computer application programs
2. To get accustomed with various programming constructs such as divide-and-conquer, backtracking, and dynamic programming.
3. To learn new techniques for solving specific problems more efficiently and for analyzing space and time requirements.

UNIT-I **9**

Review of order rotation & growth of functions, recurrences, probability distributions, Average case analysis of algorithms, Basic data structures such as stacks, queues, linked lists, and applications.

UNIT-II **9**

Direct access tables and hash tables, hash functions and relates analysis, Binary Search trees and Operations, AVL Trees and balancing operations, R B Trees, properties, operations.

UNIT-III **9**

B – Trees – definition – properties, operations, data structures for disjoint sets, Graph algorithms, MST single source all pair shortest paths, BFS, DFS, topological sort, strongly connected components.

UNIT-IV **9**

Quick sort randomized version, searching in linear time, More graph algorithms – maximal independent sets, coloring vertex cover, introduction to perfect graphs.

UNIT-V **9**

Algorithmic paradigms: Greedy Strategy, Dynamic programming, Backtracking, Branch-and-Bound, Randomized algorithms.

Total: 45 Periods

Course Outcomes:

1. Students are familiar with algorithmic techniques such as brute force, greedy, and divide and conquer.
2. Application of advanced abstract data type (ADT) and data structures in solving real world problems.
3. Effectively combine fundamental data structures and algorithmic techniques in building a complete algorithmic solution to a given problem

REFERENCES:

1. Sartaj Sahni: Data Structures Algorithms and Applications in C++, 2nd Edition, Universities
   Press, 2007.
2. Ellis Horowitz, SartajSahni, Rajasekharan: Fundamentals of Algorithms, 2nd Edition, Universities Press, 2009.
3. Aho V Alfred, Hapcroft E John, Ullman D Jeffry: Data Structures and Algorithms, 1st Edition,
   Pearson Education, 2002.
4. Adam Drozdek,Thomson: Data Structures and Algorithms in JAVA, 3rd Edition, Cengage Learning , 2008.
5. Horowitz, Sahni, Mehta: Fundamentals of Data Structures in C++, 2nd Edition, Universities Press, 2007.
6. H. S. Wilf, Algorithms and complexity, Prentice hall.
7. T. H. Cormen, C. E. Leiserson, R. L. Rivest, Introduction to Algorithms, Prentice hall.
8. K. VishwanathanIyer, Lecture notes for classroom use.
9. Mark Allen Weiss: Data Structures and Algorithm Analysis in C++, 3 rd Edition, Pearson Education, 2007.

M. Tech I Year I Semester

18CSEP102 ADVANCED OPERATING SYSTEMS

Course Prerequisite: NIL

L	T	P	C
3	0	0	3

Course Description:

This course covers general issues of design and implementation of advanced modern operating systems. The focus is on issues that are critical to the applications of distributed systems and computer networks, which include inter-process communication, distributed processing, sharing and replication of data and files.

Course objectives:

1. To study the characteristics of OS for Multiprocessor and Multicomputer.
2. To learn the issues related to designing OS.
3. To learn the latest trends in building Mobile OS.

UNIT-I **9**

Multiprocessor Operating Systems: System Architectures- Structures of OS – OS design issues – Process synchronization – Process Scheduling and Allocation- memory management.

UNIT-II **9**

Distributed Operating Systems: System Architectures- Design issues – Communication models – clock synchronization – mutual exclusion – election algorithms- Distributed Deadlock detection

UNIT-III **9**

Distributed scheduling - Distributed shared memory - Distributed File system – Multimedia file systems - File placement – Caching

UNIT-IV **9**

Database Operating Systems: Requirements of Database OS – Transaction process model – Synchronization primitives - Concurrency control algorithms

UNIT-V **9**

Mobile Operating Systems: ARM and Intel architectures - Power Management - Mobile OS Architectures - Underlying OS - Kernel structure and native level programming - Runtime issues- Approaches to power management

Total: 45 Periods

Course Outcomes:

1. Knowledge about advanced concepts in OS
2. Ability to develop OS for distributed systems
3. Ability to develop modules for mobile devices

REFERENCES:

1. A S Tanenbaum, Distributed Operating Systems, Pearson Education Asia, 2001
2. Source Wikipedia, Mobile Operating Systems, General Books LLC, 2010
3. M Singhal and NG Shivaratri, Advanced Concepts in Operating Systems, Tata McGraw Hill Inc, 2001

M. Tech I Year I Semester

18CSEP401 ADVANCED COMPUTER NETWORKS

L	T	P	C
3	0	0	3

Course Prerequisite: NIL

Course Description:

This course teaches Data communications, network architectures, communication protocols, data link control, medium access control; introduction to local area networks metropolitan area networks and wide area networks; introduction to Internet and TCP/IP.

Course Objectives:

1. Be familiar with the basics of data communication;
2. Be familiar with various types of computer networks;
3. Have experience in designing communication protocols;
4. Be exposed to the TCP/IP protocol suite.

UNIT-I **9**

Network Design Issues, Network Performance Issues, Network Terminology, centralized and distributed approaches for networks design, Issues in design of voice and data networks.

UNIT-II **9**

Layered and Layer less Communication, Cross layer design of Networks, Voice Networks (wired and wireless) and Switching, Circuit Switching and Packet Switching, Statistical Multiplexing.

UNIT-III **9**

Data Networks and their Design, Link layer design- Link adaptation, Link Layer Protocols, Retransmission. Mechanisms (ARQ), Hybrid ARQ (HARQ), Go Back N, Selective Repeat protocols and their analysis.

UNIT-IV **9**

Queuing Models of Networks, Traffic Models , Little's Theorem, Markov chains, M/M/1 and other Markov systems, Multiple Access Protocols , Aloha System , Carrier Sensing , Examples of Local area networks

UNIT-V **9**

Inter-networking , Bridging, Global Internet , IP protocol and addressing , Sub netting , Classless Inter domain Routing (CIDR) , IP address lookup , Routing in Internet. End to End Protocols, TCP and UDP. Congestion Control , Additive Increase/Multiplicative Decrease , Slow Start, Fast Retransmit/ Fast Recovery, Congestion avoidance, RED TCP Throughput Analysis, Quality of Service in Packet Networks. Network Calculus, Packet Scheduling Algorithms.

Total: 45 Periods

Course Outcomes:

Upon completion of this course, the students will be able to

1. Protocol, algorithms, trade-offs rationale.
2. Routing, transport, DNS resolutions
3. Network extensions and next generation architectures.

REFERENCES:

1. D. Bertsekas and R. Gallager, “Data Networks”, 2nd Edition, Prentice Hall, 1992.
2. L. Peterson and B. S. Davie, “Computer Networks: A Systems Approach”,5th Edition, Morgan Kaufman, 2011.
3. Kumar, D. Manjunath and J. Kuri, “Communication Networking: An analytical approach”, 1st Edition, Morgan Kaufman, 2004.
4. Walrand,“Communications Network: A First Course”, 2nd Edition, McGraw Hill, 2002.
5. Leonard Kleinrock, “Queueing Systems,Volume I: Theory”, 1st Edition, John Wiley and Sons, 1975.

M. Tech I Year I Semester

18CSEP402 WIRELESS SENSOR NETWORKS

	L	T	P	C
Course Prerequisite: NIL	**3**	**0**	**0**	**3**

Course Description:

A Wireless sensor network can be defined as a network of devices that can communicate the information gathered from a monitored field through wireless links.

Course Objectives:

1. Architect sensor networks for various application setups.
2. Devise appropriate data dissemination protocols and model links cost.
3. Understanding of the fundamental concepts of wireless sensor networks and have a basic.
4. Knowledge of the various protocols at various layers.
5. Evaluate the performance of sensor networks and identify bottlenecks.

UNIT-I **9**

Introduction to Wireless Sensor Networks: Course Information, Introduction to Wireless Sensor Networks: Motivations, Applications, Performance metrics, History and Design factors

Network Architecture: Traditional layered stack, Cross-layer designs, Sensor Network Architecture

Hardware Platforms: Motes, Hardware parameters

UNIT-II **9**

Introduction to ns-3: Introduction to Network Simulator 3 (ns-3), Description9 of the ns-3 core module and simulation example.

UNIT-III **9**

Medium Access Control Protocol design: Fixed Access, Random Access, WSN protocols: synchronized, duty-cycled.

Introduction to Markov Chain: Discrete time Markov Chain definition, properties, classification and analysis

MAC Protocol Analysis: Asynchronous duty-cycled. X-MAC Analysis (Markov Chain)

UNIT-IV **9**

Security: Possible attacks, countermeasures, SPINS, Static and dynamic key distribution

UNIT-V **9**

Routing protocols: Introduction, MANET protocols Routing protocols for WSN: Resource-aware routing, Data-centric, Geographic Routing, Broadcast, Multicast.

Opportunistic Routing Analysis: Analysis of opportunistic routing (Markov Chain)
Advanced topics in wireless sensor networks.

Total: 45 Periods

Course Outcomes:

After completion of course, students would be able to:

1. Describe and explain radio standards and communication protocols for wireless sensor networks.
2. Explain the function of the node architecture and use of sensors for various applications.
3. Be familiar with architectures, functions and performance of wireless sensor networks systems and platforms.

REFERENCES:

1. W. Dargie and C. Poellabauer, "Fundamentals of Wireless Sensor Networks –Theory and Practice", Wiley 2010
2. KazemSohraby, Daniel Minoli and TaiebZnati, "wireless sensor networks -Technology, Protocols, and Applications", Wiley Interscience 2007
3. Takahiro Hara,Vladimir I. Zadorozhny, and Erik Buchmann, "Wireless Sensor Network Technologies for the Information Explosion Era", springer 2010

M. Tech I Year I Semester

18CSEP403 HIGH PERFORMANCE COMPUTING

L	T	P	C
3	0	0	3

Course Prerequisite: NIL

Course Description:

This course Clusters, providing a solid foundation in parallel computer architectures, cluster operating systems, and performance & optimization techniques. This course will discuss fundamentals of what an HPC cluster consists of, and how we can take advantage of such systems to solve large scale problems in wide ranging applications like computational fluid dynamics, image processing, machine learning and analytics.

Course Objectives:

1. To introduce the concepts of Modern Processors.
2. To introduce Optimization techniques for serial code.
3. To introduce Parallel Computing Paradigms.
4. To introduce Parallel Programming using OpenMP and MPI

UNIT-I **9**

Modern Processors : Stored Program Computer Architecture- General purpose cache- based microprocessor-Performance based metrics and benchmarks- Moore's Law- Pipelining- Superscalarity-SIMD- Memory Hierarchies Cache- mapping- prefetch- Multicore processors- Multithreaded processors- Vector Processors- Design Principles- Maximum performance estimates- Programming for vector architecture.

UNIT-II **9**

Basic optimization techniques for serial code : scalar profiling- function and line based runtime profiling- hardware performance counters- common sense optimizations- simple measures, large impact- elimination of common subexpressions- avoiding branches- using simd instruction sets- the role of compilers - general optimization options- inlining - aliasing- computational accuracy- register optimizations- using compiler logs- c++ optimizations - temporaries- dynamic memory management- loop kernels and iterators data access optimization: balance analysis and light speed estimates- storage order- case study: jacobi algorithm and dense matrix transpose.

UNIT-III **9**

Parallel Computers : Taxonomy of parallel computing paradigms- Shared memory computers- Cache coherence- UMA - ccNUMA- Distributed-memory computers- Hierarchical systems- Networks- Basic performance characteristics- Buses- Switched and fat- tree networks- Mesh networks- Hybrids - Basics of parallelization - Why parallelize - Data Parallelism - Function Parallelism- Parallel Scalability- Factors that limit parallel execution- Scalability metrics- Simple scalability laws- parallel efficiency - serial performance Vs Strong scalability- Refined

performance models- Choosing the right scaling baseline- Case Study: Can slow processors compute faster- Load balance

UNIT-IV **9**

Distributed memory parallel programming with MPI : message passing - introduction to MPI – example - messages and point-to-point communication - collective communication – non blocking point-to-point communication- virtual topologies - MPI parallelization of Jacobi solver- MPI implementation - performance properties.

UNIT-V **9**

Shared memory parallel programming with OpenMp : introduction to OpenMp - parallel execution - data scoping- OpenMp work sharing for loops- synchronization - reductions - loop scheduling - tasking - case study: OpenMp- parallel jacobi algorithm- advanced OpenMp wavefront parallelization- Efficient OpenMP programming: Profiling OpenMP programs - Performance pitfalls- Case study: Parallel Sparse matrix-vector multiply.

Efficient MPI programming: MPI performance tools- communication parameters- Synchronization, serialization, contention- Reducing communication overhead- optimal domain decomposition- Aggregating messages – Nonblocking Vs Asynchronous communication- Collective communication- Understanding intra-node point-to-point communication

Total: 45 Periods

Course Outcomes:

After completion of course, students will be able to

1. Learn the concepts used in Modern Processors for increasing the performance.
2. Understand the Optimization techniques for serial code.
3. learn the Parallel Computing Paradigms.
4. Identify the performance issues in Parallel Programming using OpenMP and MPI

REFERENCES:

1. Charles Severance, Kevin Dowd, High Performance Computing, O'Reilly Media, 2nd Edition, 1998.
2. Kai Hwang, Faye Alaye Briggs, Computer Architecture and Parallel Processing, McGraw Hill, 1984
3. Georg Hager, Gerhard Wellein, Introduction to High Performance Computing for Scientists and Engineers, Chapman & Hall / CRC Computational Science series, 2011

M. Tech I Year I Semester

18CSEP404 DATA SCIENCE

L	T	P	C
3	0	0	3

Course Prerequisite: NIL

Course Description:

Modern scientific, engineering, and business applications are increasingly dependent on data, existing traditional data analysis technologies were not designed for the complexity of the modern world. Data Science has emerged as a new, exciting, and fast-paced discipline that explores novel statistical, algorithmic, and implementation challenges that emerge in processing, storing, and extracting knowledge from Big Data.

Course Objectives:

1. Provide you with the knowledge and expertise to become a proficient data scientist.
2. Demonstrate an understanding of statistics and machine learning concepts that are vital for data science.
3. Produce Python code to statistically analyse a dataset.
4. Critically evaluate data visualisations based on their design and use for communicating stories from data.

UNIT-I **9**

Introduction to core concepts and technologies: Introduction, Terminology, data science process, data science toolkit, Types of data, Example applications.

UNIT-II **9**

Data collection and management: Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, Using multiple data sources.

UNIT-III **9**

Data analysis: Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic, Samples/CLT, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes.

UNIT-IV **9**

Data visualisation: Introduction, Types of data visualization. Data for visualisation: Data types, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings.

UNIT-V **9**

Applications of Data Science, Technologies for visualisation, Bokeh (Python) Recent trends in various data collection and analysis techniques, various visualization techniques, application development methods of used in data science.

Total: 45 Periods

Course Outcomes:

Upon successful completion of the course, students will be able to

1. Explain how data is collected, managed and stored for data science;
2. Understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists;
3. Implement data collection and management scripts using MongoDB

REFERENCES:

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly.
2. Jure Leskovek, AnandRajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press.

M. Tech I Year I Semester

18CSEP405 MACHINE LEARNING

L	T	P	C
3	0	0	3

Course Prerequisite: NIL

Course Description:

Machine learning uses interdisciplinary techniques such as statistics, linear algebra, optimization, and computer science to create automated systems that can sift through large volumes of data at high speed to make predictions or decisions without human intervention.

Course Objectives:

1. To learn the concept of how to learn patterns and concepts from data without being explicitly.
2. Programmed in various IOT nodes.
3. To design and analyse various machine learning algorithms and techniques with a modern.
4. Outlook focusing on recent advances.
5. Explore supervised and unsupervised learning paradigms of machine learning.
6. To explore Deep learning technique and various feature extraction strategies.

UNIT-I **9**

Basic methods: Distance-based methods, Nearest-Neighbours, Decision Trees, Naive Bayes Linear models: Linear Regression, Logistic Regression, Generalized Linear Models. Support Vector Machines, Nonlinearity and Kernel Methods. Beyond Binary Classification: Multi-class/Structured Outputs, Ranking.

UNIT-II **9**

Clustering: K-means/Kernel K-means. Dimensionality Reduction: PCA and kernel PCA. Matrix Factorization and Matrix Completion. Generative Models (mixture models and latent factor models).

UNIT-III **9**

Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forests)

UNIT-IV **9**

Sparse Modeling and Estimation, Modeling Sequence/Time-Series Data, Deep Learning and Feature Representation Learning

UNIT-V **9**

Scalable Machine Learning (Online and Distributed Learning)A selection from some other advanced topics, e.g., Semi-supervised Learning, Active Learning, Reinforcement Learning, Inference in Graphical Models, Introduction to Bayesian Learning and Inference.

Total: 45 Periods

Course Outcomes:

After completion of course, students would be able to:

1. Extract features that can be used for a particular machine learning approach in various IOT applications.
2. Compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach.
3. Mathematically analyse various machine learning approaches and paradigms.

REFERENCES:

1. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)
3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

M. Tech I Year I Semester

18CSEP406 HUMAN AND COMPUTER INTERACTION

Course Prerequisite: NIL

L	T	P	C
3	0	0	3

Course Description

Human-computer interaction is an interdisciplinary field that integrates theories and methodologies from computer science, cognitive psychology, design, and many other areas. The course is intended to introduce the student to the basic concepts of human-computer interaction. The course introduces fundamental methods, principles and tools for designing, programming and testing interactive systems.

Course Objectives:

1. Learn the foundations of Human Computer Interaction
2. Understand the classic mobile application design platform.
3. Learn and understand the web design interface.
4. Be familiar with the design technologies for individuals and persons with disabilities
5. Be aware of mobile Human Computer interaction.

UNIT-I **9**

Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models– frameworks – Ergonomics – styles – elements – interactivity- Paradigms.

UNIT-II **9**

Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle –usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

UNIT-III **9**

Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW.

UNIT-IV **9**

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

UNIT-V **9**

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.

Total: 45 Periods

Course Outcomes:

After completion of course, students would be:

1. Apply HCI principles and a user-centered approach to interaction design.
2. Analyze user needs and requirements for interface design
3. Understand the structure of models and theories of human computer interaction and vision.
4. Design an interactive web interface on the basis of models.
5. Able to design a mobile platform based HCI interface ideas

REFERENCES:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004 (UNIT I, II & III)
2. Brian Fling, "Mobile Design and Development", First Edition, OReilly Media Inc., 2009 (UNIT –IV)
3. Bill Scott and Theresa Neil, "Designing Web Interfaces", First Edition, O□Reilly, 2009. (UNIT-V)

M. Tech. I Year I Semester

18CSEP201 ADVANCED ALGORITHMS AND DATA STRUCTURES LAB

L	T	P	C
0	0	4	2

Course Prerequisite: NIL

Course Description:

This course makes the students to implement programs on data structures. Data structures play a central role in modern computer science. In addition, data structures are essential building blocks in obtaining efficient algorithms.

Course Objectives:

1. To develop skills to design and analyze linear and non-linear data structures.
2. Develop algorithms for manipulating linked lists, stack, queues, trees, and graphs.
3. Develop recursive algorithms as they apply to trees and graphs.
4. To develop a base for advanced computer study.

Implement the following using Java

1. Write a program to perform the following operations on singly linked list.
   i) Creation ii) Insertion iii) Deletion iv) Traversal.
2. Write a program to perform the following operations on doubly linked list.
   i) Creation ii) Insertion iii) Deletion iv) Traversal in both ways
3. Write a program that implements stack (its operations) using
   i) Arrays ii) linked list
4. Write a programs that implements Queue (its operations) using
   i) Arrays ii) linked list
5. Write a program that implements the Quick sort method to sort a given list of integers in ascending order.
6. Write a program that implement the Merge sort method to sort a given list of integers in ascending order.
7. Write a program that implement the SHELL sort method to sort a given list of integers in ascending order.
8. Write a program to perform the following:
   i) Creating a Binary Tree of integers
   ii) Traversing the above binary tree in preorder, inorder and postorder.
9. Write a program to perform the following:
   i) Creating a AVL Tree of integers
   ii) Traversing the above binary tree in preorder, inorder and postorder.
10. Write a program that uses functions to perform the following:
    i) Creating a SplayTree of integers
    ii) Traversing the above binary tree in preorder, inorder and postorder.

11. Write a program to perform the following:
    i) Creating a B-Tree of integers
    ii) Traversing the above binary tree in preorder, inorder and postorder.
12. Write a program that implements Kruskals algorithm using a disjoint set data structure. The program takes as input a file (data.txt), in which each line either represents a vertex or an edge. For the edge lines, the first integer on that liner representing the starting vertex, the second the ending vertex, and the third the weight of the edge. Use this file to construct, line by line, the graph upon which Kruskal's algorithm will be run (do NOT hardcode this graph!).
13. Write a program to simulate various graph traversing algorithms.
14. Write a program to find the minimal spanning tree of a graph using the Prim's algorithm. The program should be able to read in the weight matrix of a graph and produce the minimal spanning tree Generate weight matrices (using a random number generator) with a large number of nodes and estimate the time complexity of the algorithm.
15. Write a program to find the closest pair of points using a divide and conquer strategy. Use the random number generator to generate a large number of points in a unit square as input to the algorithm. Test the correctness of the algorithm by using a brute force method.
16. Use dynamic programming to find the optimal binary search tree for a given set of numbers together with their probabilities. Remember that the numbers may be generated in any order, so, a pre-sorting step is also required.

Course Outcomes:

Upon successful completion of the course, students will be able to

1. Implement List ADTs and their operations.
2. Develop programs for sorting.
3. Develop programs for implementing trees and their traversal operations.
4. Implement graph traversal algorithms.
5. Apply algorithm design techniques.

REFERENCES:

1. SartajSahni : Data Structures Algorithms and Applications in C++, 2 nd Edition, Universities Press, 2007.
2. Ellis Horowitz, SartajSahni, Rajasekharan: Fundamentals of Algorithms, 2nd Edition, Universities Press, 2009.
3. Aho V Alfred, Hapcroft E John, Ullman D Jeffry: Data Structures and Algorithms, 1 st Edition, Pearson Education, 2002.
4. Adam Drozdek,Thomson: Data Structures and Algorithms in JAVA, 3 rd Edition, Cengage Learning , 2008.
5. Horowitz, Sahni, Mehta: Fundamentals of Data Structures in C++, 2 nd Edition, Universities Press, 2007.
6. Mark Allen Weiss: Data Structures and Algorithm Analysis in C++, 3 rd Edition, Pearson Education, 2007.

M.Tech. I Year I Semester

18CSEP202 ADVANCED OPERATING SYSTEMS LAB

L	T	P	C
0	0	4	2

Course Prerequisite: NIL

Course Description:

This course covers general issues of design and implementation of advanced modern operating systems. The focus is on issues that are critical to the applications of distributed systems and computer networks, which include inter-process communication, distributed processing, sharing and replication of data and files.

Course Objectives:

1. Understand and implement basic services and functionalities of the operating system using system calls.
2. Use modern operating system calls and synchronization libraries in software/ hardware interfaces.
3. Understand the benefits of thread over process and implement synchronized programs using multithreading concepts.
4. Understand how to provide security for the processes

List of Experiments:

1. Design and Develop a shell that should support at least 20 commands.
2. Design and develop a program to implement lazy buddy system algorithm.
3. Write a multi-class multithreaded program that simulates multiple sleeping barbers, all in one barbershop that has a finite number of chairs in the waiting room. Each customer is instantiated from a single customer class.
4. Use ECOS operating system to develop a program for controlling accessing to a pool of resources using mutexes and condition variables.
5. Design and develop a program to realize the virus classification, such as boot sector infector, file infector and macro virus.
6. Process creating new process, counting maximum number of processes a system can handle at a time, handling system calls; inter process communication through pipes and message passing, zombie process, orphan process.
7. Process Synchronization: handling threads and semaphores to achieve synchronization among processes using POSIX standard functions.

Course Outcomes:

After completing this course the students should be able to

1. Understand the design approaches of advanced operating systems
2. Analyze the design issues of distributed operating systems.

3. Evaluate design issues of multi processor operating systems.
4. Identify the requirements of database operating systems.
5. Formulate the solutions to schedule the real time applications.

REFERENCES:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, 8th Ed., John Wiley, 2008.
2. William Stallings, Operating Systems: Internals and Design Principles. Prentice-Hall, 6th Ed., 2008.
3. AS Tanenbaum, Modern Operating Systems, 3rd Ed., Pearson, 2009.
4. AS Tanenbaum, AS Woodhull, Operating Systems Design and Implementation, 3rd Ed., Prentice Hall, 2006.

M. Tech I Year I Semester

18RMP101 RESEARCH METHODOLOGY & IPR

Course Prerequisite: NIL

L	T	P	C
2	0	0	2

UNIT-I **9**

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT-II **9**

Effective literature studies approaches, analysis Plagiarism, Research ethics,

UNIT-III **9**

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT-IV **9**

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT-V **9**

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Total: 45 Periods

Course Outcomes:

At the end of this course, students will be able to

1. Understand research problem formulation.
2. Analyze research related information
3. Follow research ethics
4. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.

5. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
6. Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

REFERENCES:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
5. Mayall, "Industrial Design", McGraw Hill, 1992.
6. Niebel, "Product Design", McGraw Hill, 1974.
7. Asimov, "Introduction to Design", Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.
9. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

AUDIT COURSE - I

AUDIT COURSE - I

18AUP901 DISASTER MANAGEMENT

L	T	P	C
2	0	0	0

Course Objectives:

Upon the completion of subject student will be able to-

1. Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. Critically understand the strengths and weaknesses of disaster management approaches,
5. Planning and programming in different countries, particularly their home country or the countries they work in

UNIT-I

Disaster classification **6**

Disaster: definition, factors and significance; difference between hazard and

Disaster; natural disaster: earthquakes, volcanisms, cyclones, tsunamis, floods, droughts and famines, landslides and avalanches; man-made disasters: nuclear reactor meltdown, industrial accidents, oil slicks and spills, outbreaks of disease and epidemics, war and conflicts

UNIT-II

Repercussions of Disasters **6**

Economic damage, loss of human and animal life, destruction of ecosystem.

Disaster Prone Areas in India:

Study of seismic zones; areas prone to floods and droughts, landslides and Avalanches; areas prone to cyclonic and coastal hazards with special reference to tsunami.

UNIT-III

Disaster Preparedness and Management **6**

Preparedness: monitoring of phenomena triggering a disaster or hazard; Evaluation of risk: application of remote sensing, data from meteorological and Other agencies, media reports: governmental and community preparedness.

UNIT-IV

Risk Assessment **6**

Disaster risk: concept and elements, disaster risk reduction, global and national disaster risk situation. Techniques of risk assessment, global co-operation in risk assessment and warning.

UNIT-V

Disaster Mitigation **6**

Meaning, concept and strategies of disaster mitigation, emerging trends in Mitigation. Structural mitigation and non-structural mitigation, programs of Disaster mitigation in India.

Total: 30 Periods

Course outcomes:

After the completion of the subject following outcomes can be achieved-

1. Students will be able to understand disaster and its types in general.
2. They will understand the post disaster damage in terms of both like and commodity.
3. They will have clear picture of disaster-prone zones.
4. They will be able to understand the pre and post disaster preparedness needed to mitigate the disaster impact in large scale.
5. Student will also understand to quantify the risk in terms of monetary for both commodity and life.
6. Student will also learn the structural and non-structural measures for risk mitigation

REFERENCES:

1. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation
2. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
3. Sahni, PardeepEt.Al. (Eds.)," Disaster Mitigation Experiences and Reflections", Prentice Hall Of India, New Delhi.
4. Goel S. L., Disaster Administration And Management Text and Case Studies" ,Deep&Deep Publication Pvt. Ltd., New Delhi

AUDIT COURSE - I

18AUP902 SANSKRIT FOR TECHNICAL KNOWLEDGE

Course Prerequisite: None	**L**	**T**	**P**	**C**
	2	**0**	**0**	**0**

Course Objectives:

Upon the completion of subject student will be able to:

1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world
2. Learning of Sanskrit to improve brain functioning
3. Learning of Sanskrit to develop the logic in mathematics, science & other subjects
4. enhancing the memory power
5. The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

UNIT-I **6**

Alphabets- Vowels- Consonants - Māheśvara sutras - Combined alphabets- Verbs- Basic words

UNIT-II **6**

Singular/Dual/Plural – Nominative case – Accusative case - Instrumental case - Dative case - Ablative case- Genitive case - Locative case

UNIT-III **6**

Nouns and adjectives – Indeclinables - Present tense - Past tense - Future tense- Order and request– Prefixes - Number word - Combinations and cases

UNIT -IV **6**

Sanskrit literature-Harsacaritasangrah-Kumarasambhava-sabdamanjari

UNIT -V **6**

Technical concept of Architecture-Manasar text –logic- nyaya sutras –pramana-mathematics-sulva sutras-baudhyana theorem.

Total: 30 Periods

Course Outcomes:

Students will be able to

1. Understanding basic alphabets and vowels
2. Understanding the cases in Sanskrit language
3. Understanding of Nouns and tense
4. Understanding of some literature
5. Analyzing the observation through pramana, application of architecture and mathematics

REFERENCES:

1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

AUDIT COURSE - I

18AUP903 CONSTITUTION OF INDIA

L	T	P	C
2	0	0	0

Course Objectives:

Students will be able to:

1. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.
4. To get knowledge about the Indian Federal System and Center – State Relations
5. To Understand the Election Commission functions and administration system

UNIT-I: INTRODUCTION **6**

Historical Background – Drafting Committee (Composition & Working) – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.

UNIT-II: STRUCTURE AND FUNCTION OF CENTRAL GOVERNMENT **6**

Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

UNIT-III: STRUCTURE AND FUNCTION OF STATE GOVERNMENT **6**

State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature –Judicial System in States – High Courts and other Subordinate Courts.

UNIT-IV CONSTITUTION FUNCTIONS **6**

Indian Federal System – Center – State Relations – President's Rule – Constitutional Amendments –Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

UNIT-V: ELECTION COMMISSION **6**

Central Election Commission - Role and functioning – Chief Election Commissioner and Election Commissioners – State Election Commission – Institute and Bodies for the welfare of SC/ST/OBC and Women

Total: 30 Periods

Course Outcomes:

Upon completion of the course, students will be able to:

1. Know about Human rights protection by Indian Constitution.
2. Understand the functions of the Indian government
3. Understand and abide the rules of the Indian constitution.
4. Role of Constitution in Socio-economic development and welfare activities of the Country.

TEXTBOOKS:

1. Durga Das Basu, "Introduction to the Constitution of India ", Prentice Hall of India, New Delhi.
2. R.C.Agarwal, (1997) "Indian Political System", S.Chand and Company, New Delhi.

REFERENCES:

1. The Constitution of India, 1950 (Bare Act), Government Publication
2. Dr. S.N. Busi, Dr. B.R. Ambedkar framing of Indian Constitution, 1st Edition, 2015
3. M.P. Jain, Indian Constitution Law, 7thEdn., Lexis Nexis, 204
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015

AUDIT COURSE - I

18AUP904 PEDAGOGY STUDIES

L	T	P	C
2	0	0	0

Course Objectives:

Students will be able to:

1. Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
2. Identify critical evidence gaps to guide the development.

UNIT-I

Introduction and Methodology **6**

- Aims and rationale, Policy background, Conceptual framework and terminology
- Theories of learning, Curriculum, Teacher education.
- Conceptual framework, Research questions**.**
- Overview of methodology and Searching.

UNIT-II **6**

- Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries.
- Curriculum, Teacher education.

UNIT-III **6**

- Evidence on the effectiveness of pedagogical practices
- Methodology for the in-depth stage: quality assessment of included studies.
- How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?
- Theory of change.
- Strength and nature of the body of evidence for effective pedagogical practices.
- Pedagogic theory and pedagogical approaches.
- Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT-IV **6**

- Professional development: alignment with classroom practices and follow-up support
- Peer support
- Support from the head teacher and the community.
- Curriculum and assessment
- Barriers to learning: limited resources and large class sizes

UNIT-V **6**

- Research gaps and future directions
- Research design
- Contexts
- Pedagogy
- Teacher education
- Curriculum and assessment
- Dissemination and research impact.

Total: 30 Periods

Course Outcomes:

Students will be able to understand:

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy

TEXT BOOKS/ REFERENCES:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2):245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, ‘learning to read’ campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

M. Tech. I Year II Semester

18CSEP103 CLOUD COMPUTING

L	T	P	C
3	0	0	3

Course Prerequisite: NIL

Course Description:
Cloud computing is a key distributed systems paradigm that has grown popular in the last few years. Cloud technologies are pervasive, touching our daily lives any time we access the World Wide Web, use a mobile app, or make a retail purchase.

Course Objectives:

1. To understand the concepts of cloud and utility computing
2. To understand the various issues in cloud computing
3. To familiarize themselves with the lead players in cloud
4. To appreciate the emergence of cloud as the next generation computing paradigm
5. To be able to set up a private cloud

UNIT -I: INTRODUCTION **9**

Evolution of Cloud Computing -System Models for Distributed and Cloud Computing - NIST Cloud Computing Reference Architecture -IaaS - On-demand Provisioning - Elasticity in Cloud - Examples of IaaS Providers - PaaS - Examples of PaaS Providers - SaaS - Examples of SaaS Providers - Public , Private and Hybrid Clouds – Google App Engine, Amazon AWS - Cloud Software Environments -Eucalyptus, Open Nebula, Open Stack, Nimbus

UNIT -II: VIRTUALIZATION **9**

Basics of Virtual Machines - Process Virtual Machines – System Virtual Machines – Emulation – Interpretation – Binary Translation - Taxonomy of Virtual Machines. Virtualization –Management Virtualization — Hardware Maximization – Architectures – Virtualization Management – Storage Virtualization – Network Virtualization

UNIT -III: VIRTUALIZATION INFRASTRUCTURE **9**

Comprehensive Analysis – Resource Pool – Testing Environment –Server Virtualization – Virtual Workloads – Provision Virtual Machines –Desktop Virtualization – Application Virtualization – Work with AppV – Mobile OS for smart phones – Mobile Platform Virtualization – Collaborative Applications for Mobile platforms

UNIT -IV: PROGRAMMING MODEL **9**

Map Reduce Hadoop Distributed File Systems – Hadoop I/O – Developing Map Reduce Applications – Working of Map Reduce – Types and Formats – Setting up Hadoop Cluster

UNIT -V: CLOUD INFRASTRUCTURE AND SECURITY **9**

Architectural Design of Compute and Storage Clouds - Inter Cloud Resource Management - Resource Provisioning and Platform Deployment - Global Exchange of Cloud Resources - Security Overview – Cloud Security Challenges – Software as a Service Security – Security Governance –

Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security.

Total: 45 Periods

Course Outcomes:

Upon completion of this course, the student should be able to

1. Articulate the main concepts, key technologies, strengths and limitations of cloud computing
2. Identify the architecture, infrastructure and delivery models of cloud computing
3. Explain the core issues of cloud computing such as security, privacy and interoperability
4. Choose the appropriate technologies, algorithms and approaches for the related issues

REFERENCES:

1. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation, Management, and Security", CRC Press, 2010.
3. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", McGraw-Hill Osborne Media, 2009.
4. Jim Smith, Ravi Nair, "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005.
5. Danielle Ruest, Nelson Ruest, “Virtualization: A Beginner‟s Guide”, McGraw-Hill Osborne Media, 2009.
6. Tom White, "Hadoop: The Definitive Guide", Yahoo Press, 2012.
7. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, “Mastering Cloud Computing”, Tata McGraw Hill, 2013.

M. Tech I Year II Semester

18CSEP104 BIG DATA ANALYTICS

Course Prerequisite: NIL

L	T	P	C
3	0	0	3

Course Description:

This course covers big data structure, Hadoop framework and analytics methods. It provides general idea about mining approaches in big data.

Course Objectives:

1. To understand the competitive advantages of big data analytics
2. To understand the big data frameworks
3. To learn data analysis methods
4. To learn stream computing
5. To gain knowledge on Hadoop related tools such as HBase, Cassandra, Pig, and Hive for big data analytics

UNIT-I: INTRODUCTION TO BIG DATA **7**

Big Data – Definition, Characteristic Features – Big Data Applications - Big Data vs Traditional Data - Risks of Big Data - Structure of Big Data - Challenges of Conventional Systems - Web Data – Evolution of Analytic Scalability - Evolution of Analytic Processes, Tools and methods - Analysis vs Reporting - Modern Data Analytic Tools.

UNIT-II: HADOOP FRAMEWORK **9**

Distributed File Systems - Large-Scale FileSystem Organization – HDFS concepts - MapReduce Execution, Algorithms using MapReduce, Matrix-Vector Multiplication – Hadoop YARN

UNIT-III: DATA ANALYSIS **13**

Statistical Methods: Regression modelling, Multivariate Analysis - Classification: SVM & Kernel Methods - Rule Mining - Cluster Analysis, Types of Data in Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods, Clustering High Dimensional Data - Predictive Analytics – Data analysis using R.

UNIT-IV: MINING DATA STREAMS **7**

Streams: Concepts – Stream Data Model and Architecture - Sampling data in a stream - Mining Data Streams and Mining Time-series data - Real Time Analytics Platform (RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

UNIT-V: BIG DATA FRAMEWORKS **9**

Introduction to NoSQL – Aggregate Data Models – Hbase: Data Model and Implementations – Hbase Clients – Examples – .Cassandra: Data Model – Examples – Cassandra Clients – Hadoop Integration. Pig – Grunt – Pig Data Model – Pig Latin – developing and testing Pig Latin scripts. Hive – Data Types and File Formats – HiveQL Data Definition – HiveQL Data Manipulation – HiveQL Queries

TOTAL: 45 Periods

Course Outcomes:

After completion of course, students will be able to

1. Understand how to leverage the insights from big data analytics
2. Analyze data by utilizing various statistical and data mining approaches
3. Perform analytics on real-time streaming data
4. Understand the various NoSql alternative database models

REFERENCES:

1. Bill Franks, ―Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics‖, Wiley and SAS Business Series, 2012.
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", 2013.
3. Michael Berthold, David J. Hand, ―Intelligent Data Analysis‖, Springer, Second Edition, 2007.
4. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
5. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
6. Richard Cotton, "Learning R – A Step-by-step Function Guide to Data Analysis, , O‘Reilly Media, 2013.

M. Tech I Year II Semester

18CSEP407 OBJECT ORIENTED SOFTWARE ENGINEERING

Course Prerequisite: NIL

L	T	P	C
3	0	0	3

Course Description:

This course covers object-oriented software engineering concepts with classical paradigm, system analysis and design approaches.

Course Objectives:

1. To understand Software Engineering paradigms
2. To update knowledge on process models
3. To study the various analysis models
4. To gain knowledge of the System Design concepts.
5. To understand software implementation and deployment approaches

UNIT-I:

CLASSICAL PARADIGM **9**

System Concepts – Project Organization – Communication – Project Management

UNIT-II:

PROCESS MODELS **9**

Life cycle models – Unified Process – Iterative and Incremental – Workflow – Agile Processes.

UNIT-III:

ANALYSIS **9**

Requirements Elicitation – Use Cases – Unified Modeling Language, Tools – Analysis Object Model (Domain Model) – Analysis Dynamic Models – Non-functional requirements – Analysis Patterns.

UNIT-IV:

DESIGN **9**

System Design, Architecture – Design Principles - Design Patterns – Dynamic Object Modeling – Static Object Modeling – Interface Specification – Object Constraint Language

UNIT-V:

IMPLEMENTATION, DEPLOYMENT AND MAINTENANCE **9**

Mapping Design (Models) to Code – Testing - Usability – Deployment – Configuration Management – Maintenance.

TOTAL: 45 Periods

Course Outcomes

After completion of course, students will be able to

1. Understand the advantages of various Software Development Lifecycle Models
2. Gain knowledge on project management approaches as well as cost and schedule estimation strategies
3. Perform formal analysis on specifications
4. Architect and design using architectural styles and design patterns
5. Understand software testing approaches

REFERENCES:

1. Bernd Bruegge, Alan H Dutoit, Object-Oriented Software Engineering, 2nd ed, Pearson Education, 2004.
2. Craig Larman, Applying UML and Patterns 3rd ed, Pearson Education, 2005.
3. Stephen Schach, Software Engineering 7th ed, McGraw-Hill, 2007.
4. Ivar Jacobson, Grady Booch, James Rumbaugh, The Unified Software Development Process, Pearson Education, 1999.
5. Alistair Cockburn, Agile Software Development 2nd ed, Pearson Education, 2007

M. Tech I Year II Semester

18CSEP408 SECURE SOFTWARE DESIGN & ENTERPRISE COMPUTING

Course Prerequisite: NIL

L	T	P	C
3	0	0	3

Course Description

The aim the course to make students aware of various issues like weak random number generation, Information leakage, poor usability, and weak or no encryption on data traffic and also to learn the Methodologies and tools to design and develop secure software containing minimum Vulnerabilities and flaws.

Course Objectives:

1. To fix software flaws and bugs in various software.
2. To make students aware of various issues like weak random number generation, information leakage, poor usability, and weak or no encryption on data traffic
3. Techniques for successfully implementing and supporting network services on an enterprise scale and heterogeneous systems environment.
4. Methodologies and tools to design and develop secure software containing minimum vulnerabilities and flaws.
5. To study and handle the various threats, attacks and malwares methodologies

UNIT-I: SECURE SOFTWARE DESIGN **9**

Identify software vulnerabilities and perform software security analysis, Master security programming practices, Master fundamental software security design concepts, Perform security testing and quality assurance.

UNIT-II: ENTERPRISE APPLICATION DEVELOPMENT **9**

Describe the nature and scope of enterprise software applications, Design distributed N-tier software application, Research technologies available for the presentation, business and data tiers of an enterprise software application, Design and build a database using an enterprise database system, Develop components at the different tiers in an enterprise system, Design and develop a multi-tier solution to a problem using technologies used in enterprise system,
Present software solution.

UNIT-III: ENTERPRISE SYSTEMS ADMINISTRATION **9**

Design, implement and maintain a directory-based server infrastructure in a heterogeneous systems environment, Monitor server resource utilization for system reliability and availability, Install and administer network services (DNS/DHCP/Terminal Services/Clustering/Web/Email).

UNIT-IV **9**

Obtain the ability to manage and troubleshoot a network running multiple services, Understand the requirements of an enterprise network and how to go about managing them.

UNIT-V **9**

Handle insecure exceptions and command/SQL injection, Defend web and mobile applications against attackers, software containing minimum vulnerabilities and flaws.

TOTAL: 45 Periods

Course Outcomes:

After completion of course, students would be able to:

1. Differentiate between various software vulnerabilities.
2. Software process vulnerabilities for an organization.
3. Monitor resources consumption in a software.
4. Interrelate security and software development process.
5. Able to design the Software which can able to overcome all threats.

REFERENCES:

1. Theodor Richardson, Charles N Thies, Secure Software Design, Jones & Bartlett Kenneth R. van Wyk, Mark G. Graff, Dan S. Peters, Diana L. Burley, Enterprise Software Security,Addison Wesley.

M. Tech I Year II Semester

18CSEP409 DESIGN PATTERNS

L	T	P	C
3	0	0	3

Course Prerequisite: NIL

Course Description:

This course describes the concepts of designing the various patterns approaches. It provides knowledge on behavioral and structural patterns.

Course Objectives:

Study the fundamental algorithms for pattern design

1. To Understand the Design patterns that are common in software applications.
2. To Understand how these patterns are related to Object Oriented design.

UNIT- I: INTRODUCTION **9**

Introduction: What is a Design Pattern? Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design patterns, Organizing the Catalog, How Design patterns solve Design problems, How to select a Design Pattern?, How to use a Design Pattern?

UNIT- II: DESIGN **9**

A Case Study: Designing a Document Editor, Design Problems, Document Structure, Formatting Embellishing the User Interface, Supporting Multiple Look and Feel Standards, Supporting Multiple Window systems, User Operations Spelling Checking and Hyphenation, Summary. Creational Patterns : Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

UNIT- III: STRUCTURAL PATTERNS **9**

Structural Pattern Part – I: Adaptor, Bridge, Composite. Structural Pattern Part – II : Decorator, acade, flyweight, proxy.

UNIT-IV: BEHAVIORAL PATTERNS I **9**

Behaviour Patterns Part – I : Chain of Responsiblity, Command, Interpreter, Iterator. Behaviour Patterns Part – II : Mediator, Memento, Observer.

UNIT-V: BEHAVIORAL PATTERNS II **9**

Behaviour Patterns Part – II (cont'd) State, strategy, Template Method, Visitor, Discussion of Behavioural Patterns. What to Expect from Design Patterns, A brief History, The Pattern Community An Invitation, A Parting Thought.

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Total: 45 Periods

Course Outcomes:

Upon successful completion of this course, students can able to:

1. Ability to understand and apply common design patterns to incremental / iterative development.
2. Ability to identify appropriate patterns for design of given problem.

REFERENCES:

1. Design Patterns Bya Erich Gamma, Pearson Education.
2. Pattern's in JAVA Vol-I By Mark Grand, Wiley Dream Tech.
3. Pattern's in JAVA Vol – II BY Mark Grand, Wiley Dream Tech.
4. JAVA Enterprise Design Patterns Vol – III By Mark Grand, Wiley Dream TECH.
5. Head First Design Patterns By Eric Freeman – Oreilly – spd.
6. Peeling Design Patterns, Prof Meda Srinivasa Rao, Narsimha Karumanchi, Career Monk Publication.
7. Design Patterns Explained By Alan Shallowy, Pearson Education.
8. Pattern Oriented Software Architecture, af.Buschman & others, John Wiley & Sons.

M. Tech I Year II Semester

18CSEP410 COMPUTER VISION

L	T	P	C
3	0	0	3

Course Prerequisite: NIL

Course Description:
This course is concerned with the image processing using classification, feature extraction and enhancement methods.

Course Objectives:
While studying this course student will be able to

1. Be familiar with both the theoretical and practical aspects of computing with images.
2. Have described the foundation of image formation, measurement, and analysis.
3. Understand the geometric relationships between 2D images and the 3D world.
4. Grasp the principles of state-of-the-art deep neural networks

UNIT- I: IMAGE PROCESSING FOUNDATIONS **9**

Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture.

UNIT- II : SHAPES AND REGIONS **9**

Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments.

UNIT- III : HOUGH TRANSFORM **9**

Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform (GHT) – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation.

UNIT-IV: 3D VISION AND MOTION **9**

Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based

representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – spline-based motion – optical flow – layered motion

UNIT-V: APPLICATIONS **9**

Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.

Total: 45 Periods

Course Outcomes:

Upon successful completion of this course, students can able to:

1. Implement fundamental image processing techniques required for computer vision.
2. Perform shape analysis.
3. Implement boundary tracking techniques.
4. Apply chain codes and other region descriptors.
5. Apply Hough Transform for line, circle, and ellipse detections.
6. Apply 3D vision techniques.
7. Implement motion related techniques.
8. Develop applications using computer vision techniques

REFERENCES:

1. D. L. Baggio et al., ―Mastering OpenCV with Practical Computer Vision Projects‖, Packt Publishing, 2012.
2. E. R. Davies, ―Computer & Machine Vision‖, Fourth Edition, Academic Press, 2012.
3. Jan Erik Solem, ―Programming Computer Vision with Python: Tools and algorithms for analyzing images‖, O'Reilly Media, 2012.
4. Mark Nixon and Alberto S. Aquado, ―Feature Extraction & Image Processing for Computer Vision‖, Third Edition, Academic Press, 2012.
5. R. Szeliski, ―Computer Vision: Algorithms and Applications‖, Springer 2011.
6. Simon J. D. Prince, ―Computer Vision: Models, Learning, and Inference‖, Cambridge University Press, 2012.

M. Tech I Year II Semester

18CSEP411 PATTERN RECOGNITION

L	T	P	C
3	0	0	3

Course Prerequisite: NIL

Course Description:

This course describes the concepts of supervised and unsupervised techniques, structural pattern recognition and feature extraction.

Course Objectives:

Study the fundamental algorithms for pattern recognition

1. To instigate the various classification techniques
2. To originate the various structural pattern recognition and feature extraction technique

UNIT- I: INTRODUCTION **9**

Overview of pattern recognition – Feature extraction and Pattern Representation - Concept of Supervised and Unsupervised classification - Introduction to Application Areas.

UNIT- II : UNSUPERVISED CLASSIFICATION **9**

Clustering for unsupervised learning and classification - Clustering concept - C-means algorithm – Hierarchical clustering procedures - Graph theoretic approach to pattern clustering - Validity of clustering solutions.

UNIT- III : STRUCTURAL PATTERN RECOGNITION **9**

Elements of formal grammars - String generation as pattern description - Recognition of syntactic description - Parsing - Stochastic grammars and applications - Graph based structural representation.

UNIT-IV: FEATURE EXTRACTION AND SELECTION **9**

Feature Selection- Outlier Removal - Data Normalization - Missing Data - Entropy minimization – Karhunen- Loeve transformation - Feature selection through functions approximation - Binary feature Selection.

UNIT-V: AN APPLICATION: HANDWRITTEN DIGIT RECOGNITION **9**

Description of the Digit Data - Pre-processing of Data - Classification Algorithms, Fuzzy logic – Fuzzy Pattern Classifiers – Pattern Classification using Genetic Algorithms – Case study using Fuzzy Pattern Classifiers and Perception.

Total: 45 Periods

Course Outcomes:

Upon successful completion of this course, students can able to:

1. Understand and apply various algorithms for pattern recognition
2. Realize the clustering concepts and algorithms
3. Bring out structural pattern recognition and feature extraction techniques

REFERENCES:

1. Richard O. Duda, Peter E. Hart and David G. Stork, "Pattern Classification", JohnWiley& Sons, 2001.
2. Earl Gose, Richard Johsonbaugh and Steve Jost, "Pattern Recognition and ImageAnalysis", Prentice Hall, 1999.
3. Robert J.Schalkoff, Pattern Recognition: Statistical, Structural and Neural Approaches, John Wiley & Sons Inc., New York, 2007.
4. Tou and Gonzales, Pattern Recognition Principles, Wesley Publication Company, London, 1974.
5. Duda R.O., and Hart.P.E., Pattern Classification and Scene Analysis, Wiley, New York, 1973.
6. Morton Nadier and Eric Smith P., Pattern Recognition Engineering, John Wiley & Sons, New York, 1993.
7. M. Narasimha Murthy and V. Susheela Devi, “Pattern Recognition”, Springer 2011.

M. Tech I Year II Semester

18CSEP412 BIO INFORMATICS

Course Prerequisite: NIL

L	T	P	C
3	0	0	3

Course Description:

This course covers the fundamental concepts of genes, searching methods and DNA. It provides the logics to handle the issues in genomics.

Course Objectives:

1. To get exposed to the fundamentals of bioinformatics.
2. To learn bio-informatics algorithm and phylogenetic concept.
3. To understand open problems and issues in replication and molecular clocks.
4. To learn assemble genomes and corresponding theorem.
5. To study and exposed to the domain of human genomics.

UNIT-I: INTRODUCTION AND FUNDAMENTALS 9

Fundamentals of genes, genomics , molecular evolution – genomic technologies –beginning of bioinformatics - genetic data –sequence data formats – secondary database – examples – data retrieval systems – genome browsers.

UNIT-II: BIOINFORMATICS ALGORITHMS AND ANALYSIS 9

Sequence alignment and similarity searching in genomic databases: BLAST and FASTA – additional bioinformatics analysis involving nucleic acid sequences-additional bioinformatics analysis involving protein sequences – Phylogenetic Analysis

UNIT-III: DNA REPLICATION AND MOLECULAR CLOCKS 9

Beginning of DNA replication – open problems – multiple replication and finding replication – computing probabilities of patterns in a string-the frequency array-converting patterns-solving problems- finding frequents words-Big-O notation –case study-The Tower of Hanoi problem

UNIT-IV: ASSEMBLE GENOMES AND SEQUENCES 9

Methods of assemble genomes – string reconstruction – De Bruijn graph – Euler‘s theorem – assembling genomes –DNA sequencing technologies – sequence antibiotics – Brute Force Algorithm – Branch and Bound algorithm – open problems – comparing biological sequences-Case Study –Manhattan tourist Problem

UNIT-V: HUMAN GENOME 9

Human and mouse genomes-random breakage model of chromosome evolution – sorting by reversals – greedy heuristic approach – break points- rearrangements in tumor and break point genomes-break point graps- synteny block construction -open problems and technologies.

Total: 45 Periods

Course Outcomes:

After Completion of the course, the students should be able to:

1. Deploy the genomics technologies in Bioinformatics.
2. Able to distinct efficient algorithm and issues.
3. Deploy the replication and molecular clocks in bioinformatics.
4. Work on assemble genomes and sequences.
5. Use the Microarray technologies for genome expression

REFERENCES:

1. Ion Mandoiu and Alexander Zelikovsky **,** Computational Methods for Next Generation Sequencing Data Analysis ― Wiley series 2016.
2. Istvan Miklos,Renyi Institutue, ―Introduction to algorithms in bio informatics,Springer 2016
3. Philip Compeau and Pavel pevzner, ―Bioinformatics Algorithms: An Active Learning Approach Second edition volume I, Cousera, 2015.
4. Supratim Choudhuri, ―Bioinformatics for Beginners, Elsevier, 2014.

M. Tech I Year II Semester

18CSEP203 CLOUD COMPUTING LABORATORY

Course Prerequisite: NIL

L	T	P	C
0	0	4	2

Course Objectives

1. The primary purpose of this lab is to familiarize you with MapReduce programming.
2. To learn cloud services and characteristics.
3. To obtain knowledge on cloud implementation.

LIST OF EXPERIMENTS

1. Software study - Hadoop MapReduce & HDFS
2. Service deployment & Usage over cloud.
3. Managing Cloud Computing Resources
4. Using existing cloud characteristics & Service models
5. Performance evaluation of services over cloud
6. Case study: Google App Engine, Microsoft Azure
7. Case study: Hadoop, Amazon, Aneka

Course Outcomes:

After completion of course, students will be able to

1. Understand the Hadoop and Map reduce.
2. Learn to Create and run cloud services
3. Implement Infrastructure, storage as a Service.
4. Implement cloud platform in real time example.

M. Tech I Year II Semester

18CSEP204 DATA ANALYTICS LABORATORY

Course Prerequisite: NIL

L	T	P	C
0	0	4	2

Course Description

This course covers data analytics methods using Hadoop and R tools.

Course Objectives

1. To implement Map Reduce programs for processing big data
2. To realize storage of big data using H base, Mongo DB
3. To analyse big data using linear models
4. To analyse big data using machine learning techniques such as SVM / Decision tree classification and clustering

LIST OF EXPERIMENTS

Hadoop

1. Install, configure and run Hadoop and HDFS
2. Implement word count / frequency programs using MapReduce
3. Implement an MR program that processes a weather dataset

R

4. Implement Linear and logistic Regression
5. Implement SVM / Decision tree classification techniques
6. Implement clustering techniques
7. Visualize data using any plotting framework
8. Implement an application that stores big data in Hbase / MongoDB / Pig using Hadoop / R.

Course Outcomes

After completion of course, students will be able to

1. Process big data using Hadoop framework
2. Build and apply linear and logistic regression models
3. Perform data analysis with machine learning methods
4. Perform graphical data analysis

AUDIT COURSE - II

AUDIT COURSE -II

18AUP905 ENGLISH FOR RESEARCH PAPER WRITING

L	T	P	C
2	0	0	0

Course objectives:

Students will be able to:

1. Understand that how to improve your writing skills and level of readability
2. Learn about what to write in each section
3. Understand the skills needed when writing a Title
4. Ensure the good quality of paper at very first-time submission

Unit I: Scientific Writing: An Introduction **6**

What is scientific writing – Language in scientific writing – Use and miss-use of English – Elements of scientific writing - Paraphrasing and Plagiarism - Hedging and Criticizing – How to identify research problem

Unit II: Writing Title and Abstract **6**

Strategies for writing effective title –Planning and preparing your abstract - Things to consider while writing abstract – Useful phrases for writing abstract

Unit III: Organising Review of the Literature; Methods of Data Collection and Data Analysis **6**

What is review of the literature - Techniques of reading and citing various studies relevant to the study – Things to consider while organising review of the literature – useful phrases while writing review of the literature. Introduction to various methods of data collection –Preparing tools and describing them - How to interpret and analyse data

Unit IV: Writing Findings, Discussion and Conclusion **6**

Useful vocabulary while writing findings, discussion, and conclusion –elaboration of the findings - Preparing and describing charts and graphs –how to organise your discussion section – Discussing the findings of your study with the literature available

Unit V: Preparing References, Appendixes and proofreading the paper **6**

Various styles of referencing and bibliography (APA, MLA, Oxford, Harvard, Chicago), – Organising and preparing Appendixes – Various strategies of proofreading

Total: 30 Periods

Course Outcomes:

At the end of the course the learners will be able to:

1. Become aware of various components of academic writing
2. Improve and use academic vocabulary while writing a research papers
3. Plan and write quality research papers in their respective field

REFERENCES:

1. Adrian Wallwork, (2011). English for Writing Research Papers. Springer New York
2. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
3. Day, R. (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
4. Highman, N. (1998), Handbook
5. Research Papers, Springer New York Dordrecht
6. Kate L. Turabian, (2007).A Manual for Writers of Research Papers, Theses, and Dissertations, Seventh Edition: Chicago Style for Students and Researchers *[7th ed.]*Chicago Guides to Writing, Editing, and Publishing

AUDIT COURSE-II

18AUP906 VALUE EDUCATION

Course Prerequisite: NIL

L	T	P	C
2	0	0	0

Course Objectives:

Students will be able to:

1. Understand value of education
2. Understand value of self- development
3. Imbibe personality development
4. Imbibe spiritual development and to about the importance of character
5. Incorporate good emotional intelligence with self-control

UNIT-I **6**

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements.

UNIT-II **6**

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline

UNIT-III **6**

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship.

Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

UNIT-IV **6**

Character –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message.

UNIT-V **6**

Competence- Emotional Intelligence- Mind your Mind, Self-control, Honesty, Studying effectively

Total: 30 Periods

Course Outcomes:

Students will be able to

1. Knowledge of self-development
2. Learn the importance of Human values
3. Developing the moral personality
4. Development of spiritual personality
5. Development of emotional personality for efficiency in work

Text/Reference Books:

1. Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

AUDIT COURSE - II

18AUP907 STRESS MANAGEMENT BY YOGA

Course Prerequisite: None

L	T	P	C
2	0	0	0

Course Objectives

Students will be able to:

1. To know the human psyche: Yogic and modern concepts
2. To have the importance for mental health
3. To know the relationship between mind and body
4. To understand the concept of stress according to modern science and yoga
5. To achieve overall health of mind through yoga

UNIT-I

Scientific Foundations of Stress **6**

Concept of stress – Sources of stress - Types of Stress – Personality factors and Stress – Stress and the college student

UNIT-II

Consequences of stress on human mind **6**

Human Psyche: Yogic and Modern concepts, behavior and consciousness – Frustration – Conflicts – Psychosomatic Disorders

UNIT-III

Mental hygiene and Yoga **6**

Mental health: A Yogic Perspective – Mental hygiene and role of Yoga in mental hygiene – Yogic principles for the management of stress (Prayer and meditation for mental health)

UNIT-IV

Ashtanga Yoga Introduction **6**

Introduction to Ashtanga Yoga – Concepts and techniques of stress management in Ashtanga yoga of Patanjali Yoga sutra (i.e. Benefits of Meditation for stress management)

UNIT-V

Yogic management of stress **6**

Specific practices for stress management: Yogasana, breath awareness, shavasana, yoganidra, pranayama and meditation

Total: 30 Periods

Course Outcomes:

Students will be able to:

1. Understand the role of yoga in stress management
2. Understanding the role of yoga in life management
3. Understanding the role of yoga in mental hygiene
4. To Develop strong mental health
5. To Develop healthy mind and there by improve efficiency

Text/Reference Books:

1. 'Certification of yoga professionals, Official guide book for Level 1 and Level 2" Excel books private limited, Noida

2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

AUDIT COURSE - II

18AUP908 PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

L	T	P	C
2	0	0	0

Course Prerequisite: None

Course Description:
This course intends and aims to enhance the confidence of the students by exposing them to various situations and contexts they face in their career. It is imperative for students to start preparing for the ever-growing competition in the Job market. This course focuses on the practical aspects of soft skills relevant to the requirements of the prospective employers in view of globalization.

Course Objectives:
1. To expose the students to those soft skills which are crucial to an employee's ability to work smarter.
2. To enhance Art of Communication, Team Skills, GD handling skills and preparing resume & Interview Skills

UNIT-I: **6**
VERBAL COMMUNICATION - Active listening – Non-Verbal Communication - Body Language.

UNIT II: **6**
DEVELOPING EMOTIONAL INTELLIGENCE – Importance of Team work - Leadership skills, self-realization (Identifying strengths and weaknesses).

UNIT III: **6**
TIME MANAGEMENT – GD skills – Roles in a GD – Do's & Don'ts – Mock GD.

UNIT IV: **6**
RESUME PREPARATION - Tips in writing resume - Interview Handling Skills Interview skills – Do's & Don'ts - Goal setting.

UNIT V: **6**
Grooming etiquette, Professional Electronic Communication-Telephone etiquette, Email etiquette.

Course Outcomes:
1. After completion of this course the students shall be able to communicate effectively and enhance their interpersonal relationship and building skills with renewed self-confidence.

2. Work together in teams and accomplish objectives in a cordial atmosphere.
3. Face Group Discussion with confidence
4. Prepare resume and face interviews.
5. Understand and develop the necessary etiquette to present oneself in a professional setting.

Total: 30 Periods

Text Books: "Soft Skills". Dr K Alex. S Chand Publications, New Delhi

References Books:

1. The Seven Habits Of Highly Effective People By Stephen R. Covey, Covey Leadership Center, 2005.
2. Negotiate To Close By Gary Karnass, Simon And Schuster, 1987.
3. The Greatest Miracle In The World – Ogmandino, Random House Publishing Group, 2009.
4. Working With Emotional Intelligence - Daniel Goleman, A&C Black, 2009.
5. Developing Communication Skills By Krishna Mohan And Meera Banerji; Macmillan India Ltd., Delhi, 2000.
6. Essentials Of Effective Communication, Ludlow And Panthon; Prentice Hall Of India, 1993.
7. Effective Presentation Skills (A Fifty-Minute Series Book) By Steve Mandel, Crisp Publications, 1996.
8. "Strategic Interviewing" By Richard Camp, Mary E. VielhaberAnd Jack L. Simonetti – Published By Wiley India Pvt. Ltd, 2007.
9. "Effective Group Discussion: Theory And Practice" By Gloria J. Galanes, Katherine Adams, John K. Brilhart, Tata Mcgraw-Hill, 2010.

M. Tech II Year I Semester

18CSEP413 MOBILE APPLICATIONS AND SERVICES

L	T	P	C
3	0	0	3

Course Prerequisite: NIL

Course Description:
This Course introduces the concepts of advanced java that can be used in developing mobile applications. Students will get the capability to develop mobile based applications. Students will learn about record management system and generic framework. They will design and develop Mobile applications with the use of J2ME, like SMS, MMS, Gaming, Multimedia, JavaFX & Android.

Course Objectives:
1. This course presents the three main mobile platforms and their ecosystems, namely Android, iOS, and PhoneGap/WebOS.
2. It explores emerging technologies and tools used to design and implement feature-rich mobile applications for smartphones and tablets.
3. It also take into account both the technical constraints relative to storage capacity, processing capacity, display screen, communication interfaces, and the user interface, context and profile

UNIT-I **9**

Introduction: Introduction to Mobile Computing, Introduction to Android Development Environment, Factors in Developing Mobile Applications, Mobile Software Engineering, Frameworks and Tools, Generic UI Development Android User.

UNIT-II **9**

More on Uis: VUIs and Mobile Apps, Text-to-Speech Techniques, Designing the Right UI, Multichannel and Multimodal Uis, . Storing andRetrieving Data, Synchronization and Replication of Mobile Data, Getting the Model Right, Android Storing and Retrieving Data, Working with a Content Provider.

UNIT-III **9**

Communications via Network and the Web: State Machine, Correct Communications Model, Android Networking and Web, Telephony Deciding Scope of an App, Wireless Connectivity and Mobile Apps, Android Telephony Notifications and Alarms: Performance, Performance and Memory Management, Android Notifications and Alarms, Graphics, Performance and Multithreading, Graphics and UI Performance, Android Graphics.

UNIT-IV **9**

Putting It All Together : Packaging and Deploying, Performance Best Practices, Android Field Service App, Location Mobility and Location Based Services Android Multimedia: Mobile Agents and Peer-to-Peer Architecture, Android Multimedia

UNIT-V **9**

Platforms and Additional Issues : Development Process, Architecture, Design, Technology Selection, Mobile App Development Hurdles, Testing, Security and Hacking , Active Transactions, More on Security, Hacking Android

Total: 45 Periods

Course Outcomes:

On completion of the course the student should be able to

1. Identify the target platform and users and be able to define and sketch a mobile application
2. Understand the fundamentals, frameworks, and development lifecycle of mobile application platforms including iOS, Android, and PhoneGap
3. Design and develop a mobile application prototype in one of the platform (challenge project)

REFERENCES:

1. Wei-Meng Lee, Beginning Android™ 4 Application Development, 2012 by John Wiley & Sons.
2. J2ME: The Complete Reference, James Keogh, Tata McGrawHill.
3. Professional Android Application Development, Wiley India Private Limited.

M. Tech II Year I Semester

18CSEP414 MODEL DRIVEN SOFTWARE DEVELOPMENT

L	T	P	C
3	0	0	3

Course Prerequisite: NIL

Course Objectives:

1. Understand the software development techniques with reference to model driven software development
2. Learn the design and implement the practical application of domain-specific modeling language
3. Learn the translation of specifications
4. Analyze emerging model-driven development techniques.
5. Integrate a set of models to perform effective software specifications.

UNIT-I **9**

MDSD basic ideas and terminology: The challenges, The goals of MDSD, MDSD approach, architecture. Case study: a typical web application. Concept formation: Common MDSD concepts and terminology, model driven architecture, architecture centric MDSD, Generative Programming.

UNIT-II **9**

Classification: MDSD vs CASE, 4GL, wizard, roundtrip engineering, MDSD and Patterns, MDSD and domain driven design. MDSD capable target architecture: Software Architecture in the context of MDSD.

UNIT-III **9**

Building blocks of software architecture. Architecture reference model, balancing the MDSD platform, MDSD and CBD, SOA, BMP. Building domain architecture: DSL construction, General transformation architecture, technical aspects of building transformations, the use of interpreters.

UNIT-IV **9**

Code generation techniques: categorization, generation techniques Model transformations with QVT, M2M language requirements. MDSD tools: roles, architecture, selection criterion and pointers.

UNIT-V **9**

Software processes - modular-based software design - Model-driven Architecture (MDA): What is metamodeling, Metalevels vs Levels of abstraction, MDA Framework: Platform Independent Model PIM and Platform Specific Model. System modeling- MOF's metamodeling.

Total: 45 Periods

Course Outcomes:

1. To Apply software development techniques with reference to model driven software development
2. To Design and implement the practical application of domain-specific modeling language
3. ToIdentify verification and translation of specifications
4. To Analyze emerging model-driven development techniques.
5. To Integrate a set of models to perform effective software specifications.

REFERENCES:

1. Thomas Stahl, Markus Voelter, Model-Driven Software Development: Technology, Engineering, Management, Wiley, 2006.
2. Anne Kleppe, Jos Warmer and Wim Bast. MDA Explained. The Model Driven Architecture, Practice and Promise, Pearson Education, Boston, USA, 2003.

M. Tech II Year I Semester

18CSEP415 NETWORK SECURITY

L	T	P	C
3	0	0	3

Course Prerequisite: NIL

Course Description:
Network security consists of the policies and practices adopted to prevent and monitor unauthorized access, misuse, modification, or denial of a computer network and network-accessible resources.

Course Objectives:
1. To learn the basics of security and various types of security issues.
2. To study different cryptography techniques available and various security attacks.
3. Explore network security and how they are implemented in real world.
4. To get an insight of various issues of Web security and biometric authentication.

UNIT-I **9**
Data security: Review of cryptography. Examples RSA, DES, ECC.

UNIT-II **9**
Authentication, non-repudiation and message integrity. Digital signatures and certificates. Protocols using cryptography (example Kerberos). Attacks on protocols.

UNIT-III **9**
Network security: Firewalls, Proxy-Servers, Network intrusion detection. Transport security: Mechanisms of TLS, SSL, IPSec.

UNIT-IV **9**
Web security – SQL injection, XSS, etc. Software security and buffer overflow. Malware types and case studies. Access Control, firewalls and host/network intrusion detection.

UNIT-V **9**
Other topics: Biometric authentication, Secure E-Commerce (ex. SET), Smart Cards, Security in Wireless Communication.

Course Outcomes:
After completion of course, students would be able to:
1. To have an understanding of basics of security and issues related to it.
2. Understanding of biometric techniques available and how they are used in today's world.
3. Security issues in web and how to tackle them.
4. Learn mechanisms for transport and network security

REFERENCES:

1. W. R. Cheswick and S. M. Bellovin. Firewalls and Internet Security. Addison Wesley, 1994.
2. W. Stallings. Cryptography and Network Security. Prentice Hall, 1999.
3. B. Schneier. Applied Cryptography. Wiley, 1999.

OPEN ELECTIVE - I

M. Tech II Year I Semester

Open Elective -I

18OEP301 BUSINESS ANALYTICS

L	T	P	C
2	0	2	3

Course Prerequisite: NIL

Course Description:
Course delves into commonly encountered business situations requiring optimization of business resources and provides basic solutions methods using traditional and advanced methods.

Course objectives:
1. Refresh basic statistics
2. Explain the importance of statistics in business analytics
3. Introduce predictive modeling for business decisions
4. Explain the tools for predictive modeling
5. Explain the use of simulation to make business decision
6. Explain the use of data mining techniques for making business decision

UNIT-I: INTRODUCTION TO BUSINESS ANALYTICS **9**

Introduction to Business Analytics (BA). Evolution and Scope of Business Analytics. Data for Business Analytics. Analyzing uncertainty and model assumptions – What if analysis, Data tables, Scenario manager and Goal Seek. Regression modelling.

UNIT-II: STATISTICS FOR BUSINESS ANALYTICS **9**

Brief overview of descriptive statistics, graphical representation of data, and overview of hypothesis testing, Introduction to R statistical software

UNIT-III: PREDICTIVE ANALYTICS METHODS **9**

Forecasting techniques – Statistical forecasting techniques. Decomposition model – Estimation of trend, seasonality and cyclical components. Smoothing models for forecasting – moving average, exponential smoothing methods, time series analysis.

UNIT-IV: SIMULATION, RISK ANALYSIS AND DATA MINING **9**

Simulation and Risk Analysis – Monte Carlo simulation Examples of simulation models, Introduction to Data Mining – Scope of Data Mining. Data exploration and reduction. Classification – Measuring classification performance. Classification techniques – K nearest neighbor, Discriminant Analysis, factor analysis, and Logistic regression.

UNIT-V: DECISION ANALYSIS **9**

Decision making with uncertain information. Decision strategies for a minimize objective. Decision strategies for a maximize objective. Decision Tress. Building a decision tree. Decision trees and risk. Sensitivity analysis, Baye‘s Rule.

Case Study: Compulsory and Relevant Cases have to be discussed in each unit.
Assignment: Two relevant assignments have to be given to the students

Total: 45 Periods

Course Outcomes:
At the end of this course students will be able to
1. Understand the need and significance of business analytics for decision making
2. Use statistical tools to extract information from raw data
3. Use regression technique to build predictive models
4. Apply simulation technique to predict business scenarios
5. Use data mining techniques to make business decisions

Text Books:
Essentials of Business Analytics, Jeffrey Camm, James Cochran, Michael Fry, Jeffrey Ohlmann, David Anderson

REFERENCES:

1. Albright C. S., Winston Wayne L. and Zappe C. J (2009). *Decision Making Using Microsoft Excel (India Edition).* Cengage Learning.
2. Evans J. R (2013). Business Analytics *Methods, Models and Decisions.* Pearson, Upper Saddle River, New Jersey.

M. Tech II Year I Semester

Open Elective - I

18OEP302 INDUSTRIAL SAFETY

L	T	P	C
3	0	0	3

Course Prerequisite: None

Course Description:
This course facilitates the students with the aspects of Industrial safety, fundamentals of maintenance engineering, Wear and Corrosion and their prevention and Periodic and preventive maintenance.

UNIT-I **9**

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT-II **9**

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT-III **9**

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT-IV **9**

Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT-V **9**

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets,

Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Total: 45 Periods

REFERENCES:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

M. Tech II Year I Semester

Open Elective - I

18OEP303 OPERATIONS RESEARCH

L	T	P	C
3	0	0	3

UNIT-I **9**

Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

UNIT-II **9**

Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming

UNIT-III **9**

Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT

UNIT-IV **9**

Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

UNIT-V **9**

Competitive Models,Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

Total: 45 Periods

Course Outcomes:

At the end of the course, the student should be able to

1. Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.
2. Students should able to apply the concept of non-linear programming
3. Students should able to carry out sensitivity analysis
4. Student should able to model the real world problem and simulate it.

REFERENCES:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

M. Tech II Year I Semester

Open Elective - I

18OEP304 COST MANAGEMENT OF ENGINEERING PROJECTS	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Introduction and Overview of the Strategic Cost Management Process

Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

REFERENCES:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

M. Tech II Year I Semester

Open Elective - I

18OEP305 COMPOSITE MATERIALS

L	T	P	C
3	0	0	3

UNIT–I **9**

INTRODUCTION

Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

UNIT – II **9**

REINFORCEMENTS

Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.

UNIT – III **9**

Manufacturing of Metal Matrix Composites

Casting – Solid State diffusion technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

UNIT–IV **9**

Manufacturing of Polymer Matrix Composites

Preparation of Moulding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression moulding – Reaction injection moulding. Properties and applications.

UNIT – V **9**

Strength

Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

Total: 45 Periods

TEXT BOOKS:

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

REFERENCES:

1. Hand Book of Composite Materials-ed-Lubin.
2. Composite Materials – K.K.Chawla.
3. Composite Materials Science and Applications – Deborah D.L. Chung.
4. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.

M. Tech II Year I Semester

Open Elective - I

18OEP306 WASTE TO ENERGY

L	T	P	C
3	0	0	3

Course Prerequisite: None

Course Description:
This course facilitates the students with the basics of how energy can be generated from waste materials.

UNIT-I **9**
Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

UNIT-II **9**
Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods – Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

UNIT-III **9**
Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

UNIT-IV **9**
Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

UNIT-V **9**
Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion – Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

Total: 45 Periods

REFERENCES:

1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.